<u>Differentiation of Composite Functions</u>

Composite functions $y = f[g(x)]$ consist of an inner function $g(x)$ and an outer function f.

The Chain Rule allows us to differentiate composite functions such as $y = (3x + 5)^6$ without having to expand it first.

For the composite function $y = (3x + 5)^6$, the inner function is $3x + 5$ and the outer function is $(\ )^6$ - the derivative of the outer function would be $6 \cdot (\ \ )^{6-1}$.

Chain Rule: If $y = f(g)$,
then $y' = f'.g'$ i.e. (derivative of outer fn) x (derivative of inner fn)

Example: Differentiate these functions.

1) $y = (2x + 1)^4$ $\qquad$ $y' = 4 \cdot (2x + 1)^{4-1} \cdot 2 = 8(2x + 1)^3$

2) $y = (\frac{2}{3}x - 9)^6$ $\qquad$ $y' = 6 \cdot (\frac{2}{3}x - 9)^{6-1} \cdot \frac{2}{3} = 4(\frac{2}{3}x - 9)^5$

3) $y = (3x^2 - 17)^9$ $\qquad$ $y' = 9 \cdot (3x^2 - 17)^{8-1} \cdot 6x = 54x(3x^2 - 17)^7$

4) $y = \frac{1}{3x-7}$ $\qquad$ $y = (3x - 7)^{-1}$

$y' = -1 \cdot (3x - 7)^{-1-1} \cdot 3 = -3(3x - 7)^{-2} = \frac{-3}{(3x-7)^2}$

Delta Ex 6.2 pg 84 Q1 – 11, 16 – 26
Extension Ex 6